



# 64-bit Intel® Xeon™ Processor MP with up to 8 MB L3 cache

**The platform of choice, now with performance  
and headroom for 64-bit software.**

## Step up to enterprise-class processors.



For enterprise computing, nothing less than 4-way processor-based systems will do. And Intel is proud to announce the sixth generation of MP processors. The 64-bit

Intel® Xeon™ processor MP includes Intel NetBurst® microarchitecture, Hyper-Threading (HT) technology,<sup>1</sup> and Intel® Extended Memory 64 Technology (Intel® EM64T), offering headroom, expandability, high performance, and outstanding reliability for mid-tier enterprise applications.



## Help your business grow with Intel's platform innovations.

The chips are based on Intel's 90 nanometer (nm) wafer fabrication process. They benefit from Intel's groundbreaking HT Technology, which helps increase compute power and throughput by up to 33%,<sup>1</sup> compared to the last generation to handle larger peak demands and increase your return on investment. The 64-bit Intel Xeon processor MP with 8 MB L3 cache delivers up to 62% higher performance than previous generations as shown in the server platform performance figure. And they deliver outstanding performance for 32-bit and increased headroom for 64-bit applications, running both simultaneously. The result? An investment that helps lower your Total Cost of Ownership (TCO) while giving you the performance and flexibility you need to grow your business.

## Architected for the future of Intel dual-core processors.

The 64-bit Intel Xeon processor MP platform is architected for Intel dual-core processors. Multi-core products are designed by including two or more full processor cores within a single processor, enabling the simultaneous management of activities. When combined with HT Technology, which allows a processor to present itself as two logical processors, these processors can process four software threads simultaneously by more efficiently using resources that otherwise may sit idle.

This new generation of Intel Xeon processor MP offers a 667 MHz dual, error-correcting independent system bus, helping businesses get the most productivity from their applications with Intel® architecture-based single-core systems today, and Intel architecture-based multi-core systems tomorrow. In addition, the platform supports quad-channel DDR2-400 memory, which offers increased DIMMs per system for enhanced memory scalability. DDR2-400 is ideal for data-intensive applications, providing up to a 20% increase in memory bandwidth over DDR 333 and up to a 40% decrease in power consumption.<sup>2</sup>

## Make the transition to 64-bit computing now with 64-bit Intel® Xeon™ processor MP-based servers.

There are compelling reasons to move your business to 64-bit computing now. 64-bit computing with an Intel Xeon processor MP gives you application headroom, I/O headroom, improved reliability, memory flexibility, and increased security as compared to the previous generation processor.

64-bit Intel Xeon processors MP also give you the flexibility to prepare for the future. By supporting large data sets and both 32- and 64-bit applications, 64-bit Intel Xeon processor MP-based servers allow the smooth migration of your business solutions to 64-bit applications. And with over two million 64-bit processors already shipped, you know you can depend on Intel's proven track record to help you make a smooth transition to the next generation of computing.

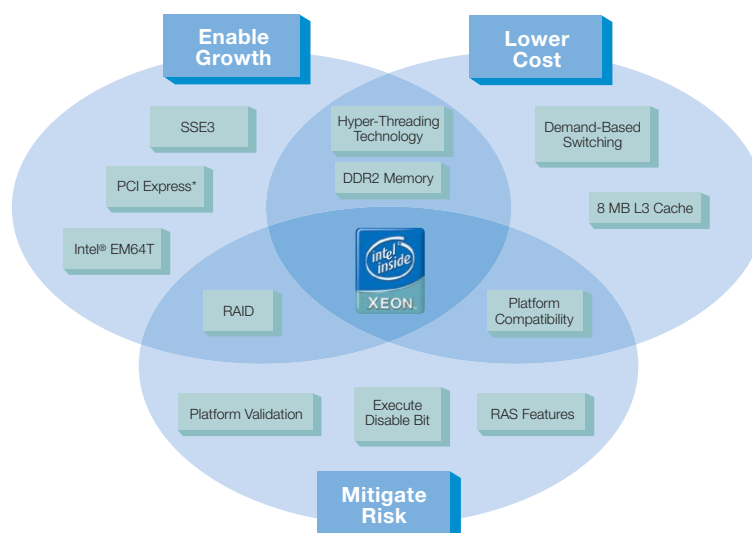
For more information on performance, please visit [www.intel.com/products/server/processors/server/xeon/](http://www.intel.com/products/server/processors/server/xeon/).

### The performance, reliability and flexibility you need.

The 64-bit Intel Xeon processor MP delivers enhanced platform performance and dependability through a variety of innovative technologies including the following:

- Fast response times with up to 8 MB of L3 cache.
- Up to 3.3 times the system bus bandwidth of previous-generation Intel Xeon processors MP with a high-speed, 3-load front-side bus with a frequency of 667 MHz.
- Power savings and system density for server applications by using Demand-Based Switching (DBS) with Enhanced Intel SpeedStep® technology.
- Scale bandwidth with PCI Express\*, a new I/O technology that matches the performance and capabilities of next-generation serial interconnects.
- Quad-channel DDR2-400 memory-based subsystem offers large memory capacity and low latency while consuming less power (vs. DDR1 memory technology).
- Reliability with enhanced RAS features including a new Error Correcting Code (ECC) bus, new memory RAID, and I/O and memory hot-plug.
- SMBus with PIROM and thermal sensor allows for scheduled service in the event of a system manufacturing defect or cooling device failure.

## The Platform of Choice Just Got Better

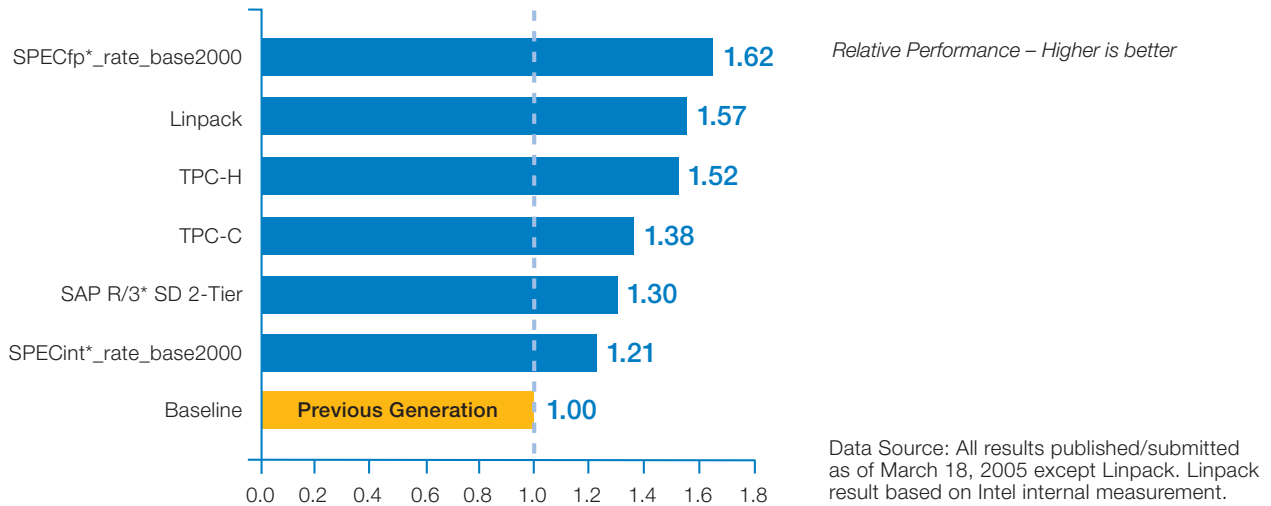


Products and technologies designed and validated together to deliver greater end-user benefits.

# 64-bit Intel® Xeon™ Processor MP

## Server Platform Performance

Compares 64-bit Intel® Xeon™ processor MP-based server platforms with its previous generation



### Configuration Details: 64-bit Intel® Xeon™ Processor MP – Server Platform Performance

**SPECfp\*\_rate\_base2000:** Baseline Platform configuration: Dell PowerEdge 6600\*, 4xIntel® Xeon™ Processor MP 3.0 GHz with 4 MB L3 Cache, 400 MHz FSB HT Off, Memory: 4 GB (4x1024 MB) DDR200; OS – Build: Microsoft Windows 2000 Advanced Server\* (SP2) 32bit; Application: SPEC\* CPU2000 benchmark binaries produced with Intel® C/C++ and FORTRAN Compilers version 7.1 (20030402Z) Referenced as published. For more information see <http://www.spec.org/cpu2000/results/res2004q1/cpu2000-20040206-02817.html>

New Platform configuration: HP ProLiant ML570\* G3 with 4xIntel® Xeon™ Processor MP 3.33 GHz with 8 MB L3 Cache, HT ON, Memory: 32 GB memory (16x2 GB DDR2-400); OS – Build: Microsoft Windows Server 2003 Enterprise Edition\* Build 3790 (RTM) 32bit; Application: SPEC\* CPU2000 benchmark binaries produced with Intel® C/C++ and FORTRAN Compilers version 8.1 (Build 20040802Z) Result submitted to [www.spec.org](http://www.spec.org) for review as of March 16, 2005

**Linpack:** Baseline Platform configuration: Intel internal measurement – Feb. 2004; Intel® SRSH4 Server (Shasta), BIOS Version: SSH40.86B.0086.B.0308011746, 4x3.0 GHz Intel® Xeon™ processors MP with 4 MB L3 cache (stepping R0); Hyper-Threading disabled, Hardware prefetch enabled, Adjacent Sector prefetch enabled, 100 MHz (400 MT/s) Bus, Chipset: ServerWorks Grand Champion\* HE; 8 GB memory (8x1 GB DDR266 installed from DIMM1to DIMM8); Red Hat Linux EL3.0\* kernel 2.4.21-4.ELcustom #2 SMP with 4 GB kernel-space and 4 GB user-space virtual memory support enabled; MKL LINPACK Version 2.0.2c binary

New Platform configuration: Intel internal measurement – Feb. 2005; Intel® SR6850HW4 (Harwich SDP) 4xIntel® Xeon™ Processor MP 3.33 GHz 8 MB L3 cache, Intel® E8500 chipset (Twincastle), Dual Independent Busses at 667 MHz, 10.67 GB/sec theoretical bandwidth; Memory: 16x1 GB DDR2-400 BIOS: SHW40.86B.B10.01.00.0031; Hardware Pre-fetch: Default state (enabled), Adjacent Cache Line Pre-fetch: Default state (enabled), HT disabled OS – Red Hat Enterprise Linux\* AS release 3 (Taroon Update 3) 2.4.21-20.EL x86\_64 GNU/Linux Workload: 5Kx5K through 44Kx44K matrix sizes used; 44Kx44K matrix allocates 15.5 GB Workload Type: Scalar

**TPC-H:** Baseline Platform configuration: IBM xSeries365\* Server with 4xIntel® Xeon™ Processors MP 3.0 GHz with 4 MB L3 Cache, Memory 16 GB DDR SUSE Linux\* Enterprise Server 9 Operating system; Database Software: IBM DB2\* UDB 8.2 Referenced as published: 5090QphH @ 300 GB \$46/QphH Availability Date Jan. 31, 2005. Results at [http://www.tpc.org/tpch/results/tpch\\_result\\_detail.asp?id=104102601](http://www.tpc.org/tpch/results/tpch_result_detail.asp?id=104102601)

New Platform configuration: IBM xSeries366\* Server with 4xIntel® Xeon™ Processors MP 3.66 GHz, Memory 32 GB DDR-2 Microsoft Windows 2003\* Operating system enterprise edition; Database Software: IBM DB2\* UDB 8.2 Referenced as published: 7731QphH @ 300GB \$33/QphH Availability Date August 20, 2005. Results at [http://www.tpc.org/tpch/results/tpch\\_result\\_detail.asp?id=105022102](http://www.tpc.org/tpch/results/tpch_result_detail.asp?id=105022102)

**TPC-C:** Baseline Platform configuration: IBM xSeries365\* Server with 4xIntel® Xeon™ Processors MP 3.0 GHz with 4 MB L3 Cache, Memory 32 GB DDR Microsoft Windows 2003\* (3790) Operating system; Database Software: Microsoft SQL Server 2000\* (Service Pack 3) Referenced as published: 102,667 tpmC; \$3.52/tpmC; Availability Date March 31, 2004. Results at [http://www.tpc.org/tpcc/results/tpcc\\_result\\_detail.asp?id=104030102](http://www.tpc.org/tpcc/results/tpcc_result_detail.asp?id=104030102)

New Platform configuration: IBM xSeries366\* Server with 4xIntel® Xeon™ Processors MP 3.66 GHz, Memory 64 GB DDR-2 Microsoft Windows 2003\* (3790) Operating system; Database Software: Microsoft SQL Server 2000\* (32-bit), SAP SD standard R/3 Enterprise\* 4.70 (64-bit) application benchmark. Referenced as published: 141,504 tpmC; \$7.03/tpmC; Availability Date August 20, 2005. Results at [http://www.tpc.org/tpcc/results/tpcc\\_result\\_detail.asp?id=105022101](http://www.tpc.org/tpcc/results/tpcc_result_detail.asp?id=105022101)

**SAP R/3\* SD 2-tier Baseline platform configuration:** IBM eServer xSeries\* x365 server platform with 4xIntel® Xeon™ processor MP 3.0 GHz with 4 MB L3 Cache, 8 GB Memory, Microsoft Windows Server 2003 Enterprise Edition\* (32-bit), IBM DB2\* UDB 8.1 (32-bit), SAP SD standard R/3 Enterprise\* 4.70 (32-bit) application benchmark. Referenced as published at 720 users. Results at <http://www50.sap.com/benchmark/pdf/cert1904.pdf>

New Platform configuration: HP ProLiant\* DL580 G3, 4-way SMP, 64-bit Intel® Xeon™ Processor MP 3.33 GHz with 8 MB L3 cache, 32 GB main Microsoft Windows Server 2003 Enterprise Edition\* (64-bit), SQL Server 2000\* (32-bit), SAP SD standard R/3 Enterprise\* 4.70 (64-bit) application benchmark. Referenced as published at 937 users. Results at <http://www50.sap.com/benchmark/>

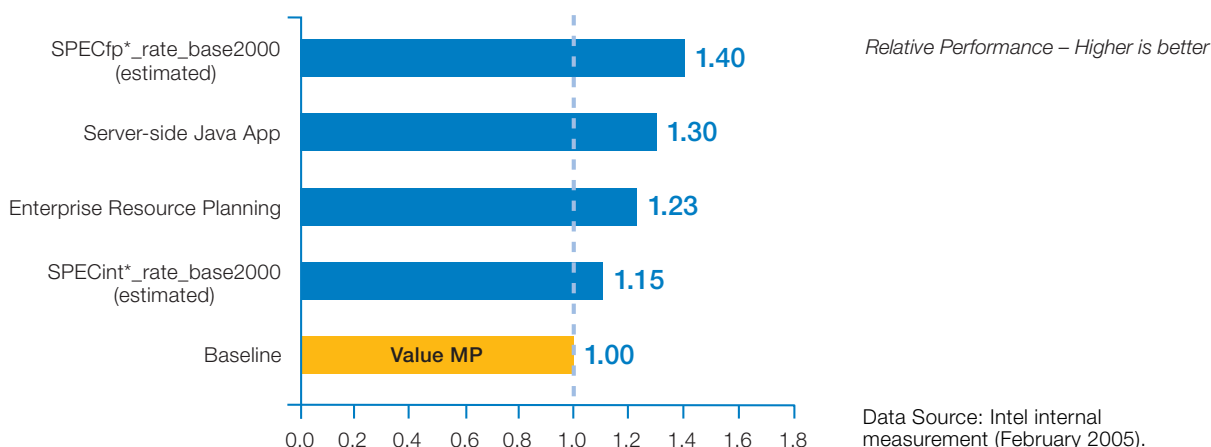
**SPECint\*\_rate\_base2000:** Baseline Platform configuration: ION Computer Systems, BX41 4xIntel® Xeon™ Processor MP 3.0 GHz with 4 MB L3 Cache and 400 MHz system bus, HT OFF, 2 GB, DDR266 memory, Red Hat Enterprise Linux ES\* release 3, Intel® C++ Compiler for Linux 8.0 (Build 20040412Z), MicroQuill SmartHeap\* Library 7.1. Result published at <http://www.spec.org/cpu2000/results/res2004q2/cpu2000-20040514-03026.html>

New Platform configuration: HP ProLiant ML570\* G3 with 4xIntel® Xeon™ Processor MP 3.33 GHz with 8 MB L3 Cache, HT ON, Memory: 32 GB memory (16x2 GB DDR2-400); OS – Build: Microsoft Windows Server 2003 Enterprise Edition\* Build 3790 (RTM) 32bit; Application: SPEC\* CPU2000 benchmark binaries produced with Intel® C/C++ and FORTRAN Compilers version 8.1 (Build 20040802Z). Result submitted to [www.spec.org](http://www.spec.org) for review as of March 16, 2005

# 64-bit Intel® Xeon™ Processor MP

## Comparison between Performance MP and Value MP

Compares 64-bit Intel® Xeon™ processor Performance MP (3.33 GHz with 8 MB L3 Cache) and Value MP (3.66 GHz with 1 MB L2 Cache)



### Configuration Details: 64-bit Intel® Xeon™ Processor MP – Comparison between Performance MP and Value MP

#### SPECfp\*\_rate\_base2000, SPECint\*\_rate\_base2000 - Performance estimates based on Intel internal measurement. For benchmark details

see [www.spec.org/cpu2000](http://www.spec.org/cpu2000): Value MP Platform configuration: Intel internal measurement – February 2005: Intel® Harwich Beta Server System (SR6850HW4-Harwich SDP) BIOS: SHW40.86B.B10.01.00.0031; 4xIntel® Xeon™ Processor MP 3.66 GHz 1 MB L2 Cache, Intel® E8500 chipset (Twincastle), Dual Independent Busses at 667 MHz; HT disabled, Memory: 16 GB (16x1 GB DDR2-400) OS – Build: Microsoft Windows Server 2003 Enterprise Edition\* Build 3790 (RTM) 32bit; Application: SPEC\* CPU2000 benchmark version 1.2 precompiled "official" binaries produced with Intel® C/C++ and FORTRAN Compilers version 8.1 (Build 20040802Z)

Performance MP Platform configuration: Intel internal measurement – February 2005: Intel® Harwich Beta Server System, BIOS: SHW40 BIOS Version 1.00, Beta BIOS 01 Build 24, 4xIntel® Xeon™ Processor MP 3.33 GHz with 8 MB L3 Cache, Intel® E8500 chipset (Twincastle), Dual Independent Busses at 667 MHz; HT ON, Memory: 16 GB (16x1 GB DDR2-400); OS – Build: Microsoft Windows Server 2003 Enterprise Edition\* Build 3790 (RTM) 32bit; Application: SPEC\* CPU2000 benchmark version 1.2 precompiled "official" binaries produced with Intel® C/C++ and FORTRAN Compilers version 8.1 (Build 20040802Z)

#### Server-Side Java App – This workload evaluates the performance of Server-side Java Application. Measured in operations per second. Performance estimates based on Intel internal measurement:

Value MP Platform configuration: Intel internal measurement – February 2005; S3E3100 Server System, "Harwich" Platform, 4xIntel® Xeon™ Processor MP 3.66 GHz 1 MB L2 Cache, H2 Stepping, BIOS: SHW40.86B.B01.01.0024, Prefetch settings: (default), Hardware prefetch enabled, Adjacent sector prefetch enabled, Memory: 8 GB (8x1 GB DDR2-400 DIMMs), Microsoft Windows Server 2003 Enterprise Edition\* RTM, BEA WebLogic\* JRockit\* 1.5.0 JVM build dra-38972-20041208-2001-win-ia32 (from BEA website)

Performance MP Platform configuration: Intel internal measurement – February 2005; S3E3100 Server System, "Harwich" Platform, 4xIntel® Xeon™ Processor MP 3.33 GHz 8 MB L3 Cache, C0 Stepping, BIOS: SHW40.86B.B01.01.0024, Prefetch settings: (default), Hardware prefetch enabled, Adjacent sector prefetch enabled, Memory: 8 GB (8x1 GB DDR2-400 DIMMs), Microsoft Windows Server 2003 Enterprise Edition\* RTM, BEA WebLogic\* JRockit\* 1.5.0 JVM build dra-38972-20041208-2001-win-ia32 (from BEA website)

#### Enterprise Resource Planning (ERP) – Workload emulates a SAP-based Sales and distribution application and helps ERP. Measured in number of concurrent users supported by the platform. Performance estimates based on Intel internal measurement:

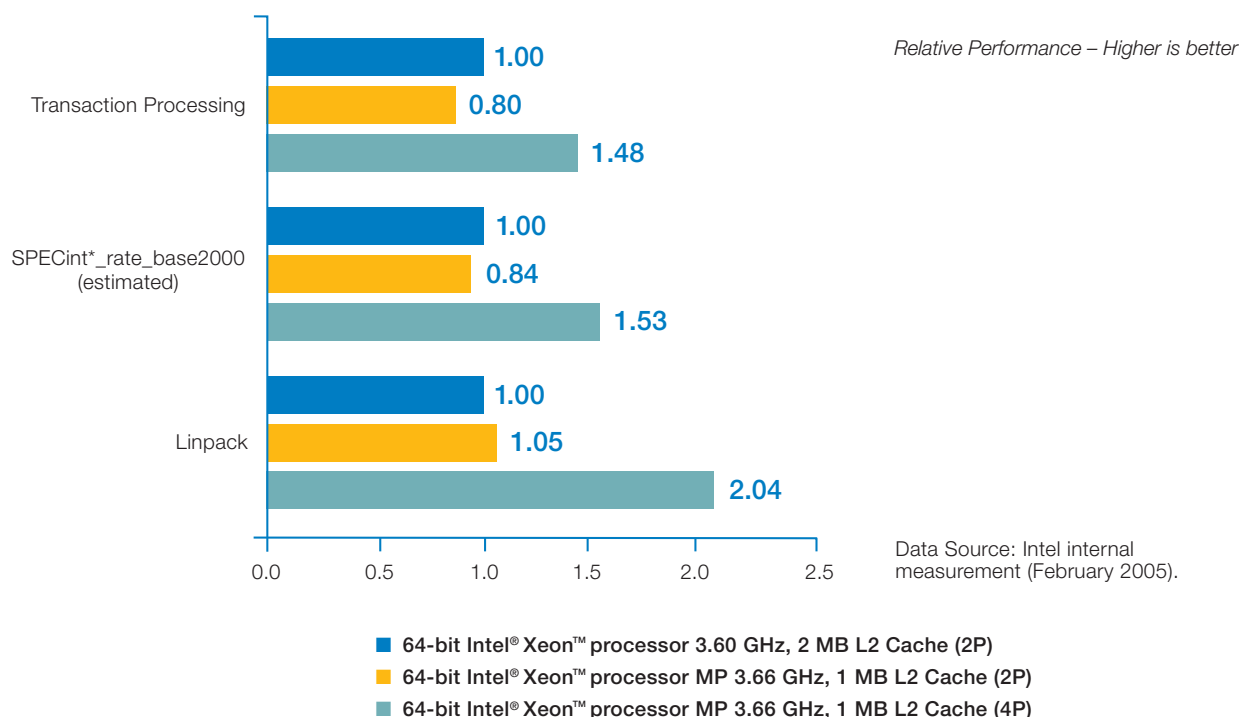
Value MP Platform configuration: Intel internal measurement – February 2005; Harwich Platform/Twincastle Chipset, BIOS: 4xIntel® Xeon™ Processor MP 3.66 GHz 1 MB L2 Cache SHW BIOS Version 1.00, Beta BIOS 01 Build 24, HWP disabled and Adjacent Sector prefetch enabled, HT ON; LSI Logic PCI-X\* Ultra320 SCSI Host Adapter, 3 SEAGATE SCSI Disk Drives\*, 15K rpm, 72 GB, Broadcom netXtreme GB Ethernet Adapter\*, Memory: 8 GB; OS: Microsoft Windows Server 2003 Enterprise\* SP1 (Build 1298); PAE is enabled; Application: SAP R/3\* v4.7 SR1 SAP Kernel Release 6.20, Patch Level 1393; Microsoft SQL Server 2000 SP3\*

Performance MP Platform configuration: Intel internal measurement – February 2005; Harwich Platform/Twincastle Chipset, 4xIntel® Xeon™ Processor MP 3.33 GHz 8 MB L3 Cache BIOS: SHW BIOS Version 1.00, Beta BIOS 01 Build 24, HWP and Adjacent Sector at default, HT ON; LSI Logic PCI-X\* Ultra320 SCSI Host Adapter, 3 SEAGATE SCSI Disk Drives\*, 15K rpm, 72 GB, Broadcom netXtreme GB Ethernet\* Adapter, Memory: 8 GB; OS: Microsoft Windows Server 2003 Enterprise SP1\* (Build 1298); PAE is enabled; Application: SAP R/3 v4.7 SR1 SAP Kernel Release 6.20, Patch Level 1393; Microsoft SQL Server 2000 SP3\*

# 64-bit Intel® Xeon™ Processor MP 3.66 GHz with 1 MB L2 Cache

## Scalability – Value MP Platform Versus DP Platform Comparison

Compares the scalability of Value MP server platforms to DP server platforms



### Configuration Details

#### 64-bit Intel® Xeon™ Processor MP 3.66 GHz with 1 MB L2 Cache Scalability – Value MP Platform Versus DP Platform Comparison

**SPECint\*\_rate\_base2000:** Performance estimates based on Intel internal measurement. For details see [www.spec.org/cpu2000/](http://www.spec.org/cpu2000/): DP Platform configuration: Dell PowerEdge® 1425SC: Two 64-bit Intel® Xeon™ processors 3.60 GHz with 2 MB L2 Cache and 800 MHz system bus HT OFF 4x512 MB (dual-ranked) DDR-2 DIMMs for RAM and Windows 2003 Standard Edition\* for OS. Compiler: Intel® C/C++ Compiler 8.1 (20041019Z); Intel® Fortran Compiler 8.1; (20041019Z). Referenced as published at 37.7 <http://www.spec.org/cpu2000/results/res2005q1/cpu2000-20050207-03820.html>

Value MP Platform configuration: Intel internal measurement – February 2005: Intel® SR6850HW4 (Harwich SDP) 2P and 4P Intel® Xeon™ Processor MP 3.66 GHz 1 MB L2 Cache, Intel® E8500 chipset (Twincastle), Dual Independent Busses at 667 MHz; Memory: 16x1 GB DDR2-400 BIOS: SHW40.86B.B10.01.00.0031; Hardware Prefetch: Default state (enabled), Adjacent Cache Line Prefetch: Default state (enabled), HT disabled; OS – Build: Microsoft Windows Server 2003 Enterprise Edition\* Build 3790 (RTM) 32bit; Application: SPEC® CPU2000 benchmark version 1.2 precompiled “official” binaries produced with Intel® C/C++ and FORTRAN Compilers version 8.1 (Build 20040802Z)

**Transaction Processing:** This application evaluates the capacity of a server in supporting transaction processing. Simulates execution of user transactions against a database in an order-entry environment. Measured in transactions per second

DP Platform configuration: Intel internal measurement – Dec 2004; Intel® S3E1411 Server System (Coyote PF400), BIOS: CY42e002, Hardware Prefetch OFF, Adjacent Sector Prefetch: ON, CPU Info: 2 X Intel® Xeon™ processor 3.60 GHz with 2 MB L2 Cache, 800 MHz FSB, HT enabled, Memory: 16 GB (8 x 2 GB DDR2 PC3200 DIMMs) Software: Microsoft Windows Server 2003\* Build 3790

Value MP Platform configuration: Intel internal measurement – Dec 2004; Intel® “Harwich” Platform, Beta baseboard (-450), Twincastle Chipset, BIOS B01 (SHW40.86B.B01.01.00.0024), Hardware Prefetch disabled, Adjacent Sector Prefetch disabled, 2P and 4P Intel® Xeon™ Processor MP 3.66 GHz 1 MB L2 cache H2 Stepping, 667 MHz FSB, HT disabled, OS – Red Hat Enterprise Linux\* AS release 3 (Taroon Update 2) Linux version 2.4.21-12.EL, EM64T OS installed on Coyote platform, Intel LINPACK Workload Version: 2.1 for EM64T, Workload: 1Kx1K through 30Kx30K matrix sizes used; 30Kx30K matrix allocates 7.2 GB Workload Type: Scalar

**Linpack:** DP Platform configuration: Intel internal measurement (January 2005) Intel® PF-400 Server System (Coyote), Lindenhurst chipset, 200 MHz FSB (800 MT/s), AMIBIOS 8.00.10, build 08/26/04, ID: CYCRB043 BIOS, with two 64-bit Intel® Xeon™ processors 3.60 GHz with 2 MB L2 Cache, 800 MHz FSB, Memory: 8x1 GB DDR2-400, HT disabled, OS – Red Hat Enterprise Linux\* AS release 3 (Taroon Update 2) Linux version 2.4.21-12.EL, EM64T OS installed on Coyote platform, Intel LINPACK Workload Version: 2.1 for EM64T, Workload: 1Kx1K through 30Kx30K matrix sizes used; 30Kx30K matrix allocates 7.2 GB Workload Type: Scalar

Value MP Platform configuration: Intel internal measurement – February 2005; Intel® SR6850HW4 (Harwich SDP) 2P and 4P Intel® Xeon™ Processor MP 3.66 GHz 1 MB L2 Cache, Intel® E8500 chipset (Twincastle), Dual Independent Busses at 667 MHz, 10.67 GB/sec theoretical bandwidth; Memory: 16x1 GB DDR2-400 BIOS: SHW40.86B.B10.01.00.0031; Hardware Prefetch: Default state (enabled), Adjacent Cache Line Prefetch: Default state (enabled), HT disabled OS – Red Hat Enterprise Linux\* AS release 3 (Taroon Update 3) 2.4.21-20.EL x86\_64 GNU/Linux Workload: 5Kx5K through 44Kx44K matrix sizes used; 44Kx44K matrix allocates 15.5 GB Workload Type: Scalar

<sup>1</sup> Source: <http://www.intel.com/technology/computing/ht/index.htm>

<sup>2</sup> Source: <http://www.elecdesign.com/Articles/Index.cfm?ArticleID=3189&pg=3>

## **For more information on 64-bit Intel® Xeon™ processor MP-based platforms please go to: [www.intel.com/business/bss/products/server/xeon\\_mp/index.htm](http://www.intel.com/business/bss/products/server/xeon_mp/index.htm)**

Performance tests and ratings are measured using specific computer systems and/or components and reflect the approximate performance of Intel products as measured by those tests. Any difference in system hardware or software design or configuration may affect actual performance. Buyers should consult other sources of information to evaluate the performance of systems or components they are considering purchasing. For more information on performance tests and on the performance of Intel products, visit <http://www.intel.com/performance/resources/limits.htm> or call (U.S.) 1-800-628-8686 or 1-916-356-3104.

All dates and products specified are for planning purposes only and are subject to change without notice.

Relative performance for each benchmark is calculated by taking the actual benchmark result for the first platform tested and assigning it a value of 1.0 as a baseline. Relative performance for the remaining platforms tested was calculated by dividing the actual benchmark result for the baseline platform into each of the specific benchmark results of each of the other platforms and assigning them a relative performance number that correlates with the performance improvements reported.

64-bit Intel® Xeon™ processors with Intel® EM64T requires a computer system with a processor, chipset, BIOS, OS, device drivers and applications enabled for Intel EM64T. Processor will not operate (including 32-bit operation) without an Intel EM64T-enabled BIOS. Performance will vary depending on your hardware and software configurations. Intel EM64T-enabled OS, BIOS, device drivers and applications may not be available. Check with your vendor for more information.

SPECint2000 and SPECfp2000 benchmark tests reflect the performance of the microprocessor, memory architecture and compiler of a computer system on compute-intensive, 32-bit applications. SPEC benchmark tests results for Intel microprocessors are determined using particular, well-configured systems. These results may or may not reflect the relative performance of Intel microprocessor in systems with different hardware or software designs or configurations (including compilers). Buyers should consult other sources of information, including system benchmarks; to evaluate the performance of systems they are considering purchasing.

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